

The opinion in support of the decision being entered today was not written for publication is not binding precedent of the Board.

Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YOSHIYUKI NISHIMURA and HIROSHI EJIRI

Appeal No. 1997-3339
Application 08/306,610

HEARD: January 16, 2001

Before JOHN D. SMITH, KRATZ, and DELMENDO, Administrative Patent Judges.

JOHN D. SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal pursuant to 35 U.S.C. § 134 from the final rejection of claims 2 and 5.

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Representative claim 5 is reproduced below:

5. Milled carbon fibers produced from mesophase pitch, said fibers consisting essentially of fibers wherein each fiber has a cylindrical configuration, a length of about 1 mm or less, and a cut surface, and wherein the plane of the cut and the axis of the fiber intersect or cross at an angle of 65E to 90E.

The references of record relied upon by the examiner are:

Hino et al. (Hino)	4,822,587	Apr. 18, 1989
Hirai et al. (Hirai)	5,227,238	Jul. 13, 1993
Arai et al. (Arai)	5,370,856	Dec. 6, 1994

(filed Nov. 16, 1992)

The appealed claims stand rejected under 35 U.S.C. § 103 as unpatentable over Arai combined with Hirai and Hino.

We cannot sustain the stated rejection.

As evident from appealed claim 5, reproduced above, the subject matter on appeal is directed to milled carbon fibers produced from mesophase pitch. According to appellants' specification at page 6, lines 15 through 18, the terminology "milled carbon fiber" means a carbon fiber which is shorter than the carbon fiber of about 1 to 25 mm generally known as "chopped strands." Thus, appellants' claimed "milled carbon fibers" have a length of "about 1 mm or less."

Appellants also report in the specification at page 3, lines 5 through 10, that depending on the type of carbon fiber precursor utilized, mutually different microstructures or high-order structures may be produced. Accordingly, it is clear that the language of the appealed claims "milled carbon fibers produced from mesophase pitch" imposes significant structural limitations on the claimed invention.

Additionally, as emphasized in appellants' brief, the claimed fibers are further defined as consisting essentially of fibers wherein each fiber has a cylindrical configuration, a length of about 1 mm or less, and significantly, a cut surface wherein the plane of the cut and the axis of the fiber intersect or cross at an angle of 65° to 90°. The claimed milled carbon fibers are said to solve a problem of carbide formation when the fibers are used in reinforced metals, i.e., carbon fiber reinforced metal (CFRM), since the configuration and surface morphology of the claimed fibers have a limited and decreased reactive surface area. In short, as explained in appellants' specification and brief, the greater the surface area of the carbon fiber, the greater the likelihood

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of reaction with the metal to produce an undesirable carbide which lowers the strength of the CFRM.

The sole reference relied upon by the examiner which even discusses milled carbon fibers is Hirai, and this reference only describes such milled carbon fibers in the background of the invention section of the patent. Hirai does disclose that milled carbon fibers which are cut to a size of less than 1 mm have been used to reinforce thermoplastics. See Hirai at column 1, lines 33-38. However, for this application, Hirai indicates that the use of milled carbon fibers have inferior characteristics because of their extremely short fiber length. See Hirai at column 1, lines 35 through 38, and lines 54 through 61. Thus, Hirai's patented and inventive carbon fiber is directed to carbon fiber chopped strands, not milled carbon fibers.

To the extent that the examiner addresses the claimed limitation that appellants' milled carbon fibers have a cut surface wherein the plane of the cut and the axis of the fiber intersect or cross in an angle of 65° to 90°, the examiner simply states that "the references are deemed to cut at 90°

angle." See the answer at page 5. However, the examiner has produced no prior art reference showing that a milled carbon fiber is necessarily cut at such an angle. Thus, there is no objective evidence of record to support the examiner's contention that with respect to prior art milled carbon fibers, a cut surface having a plane of the cut in the axis of the fiber intersecting or crossing at an angle of 65E or 90E is necessarily produced. In fact, appellants produce such a cut surface by a process wherein the milling is performed by a procedure comprising revolving a rotor equipped with a blade at a high speed and contacting the fiber with the blade to cut the fiber in a direction perpendicular to the fiber axis. Thus, in appellants processing of such fibers, the milling is performed by the use of a Victory mill, jet mill or cross flow mill. See the specification at page 11, line 25, through page 12, line 5. However, with respect to the prior art, appellants report that milling of carbon fibers has been typically performed by means of a Henschel mixer, ball mill or mixing machine, but that milling performed by these techniques is not an "appropriate procedure" because such procedures

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increase the probability of longitudinal cracks along the fiber axis. See the specification at page 12, lines 10-17.

Thus, it is apparent that the examiner's legal conclusion that the claimed subject matter would have been obvious, is not supported by an adequate factual basis. Based on the factual record before us, we cannot sustain the examiner's stated obviousness rejection of the appealed claims.

The decision of the examiner is accordingly, reversed.

REVERSED

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